Hydrogeology of the Sacramento Mountains: Implications on forest and water resource management

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New Mexico Tech
SCIENCE · ENGINEERING · RESEARCH · UNIVERSITY

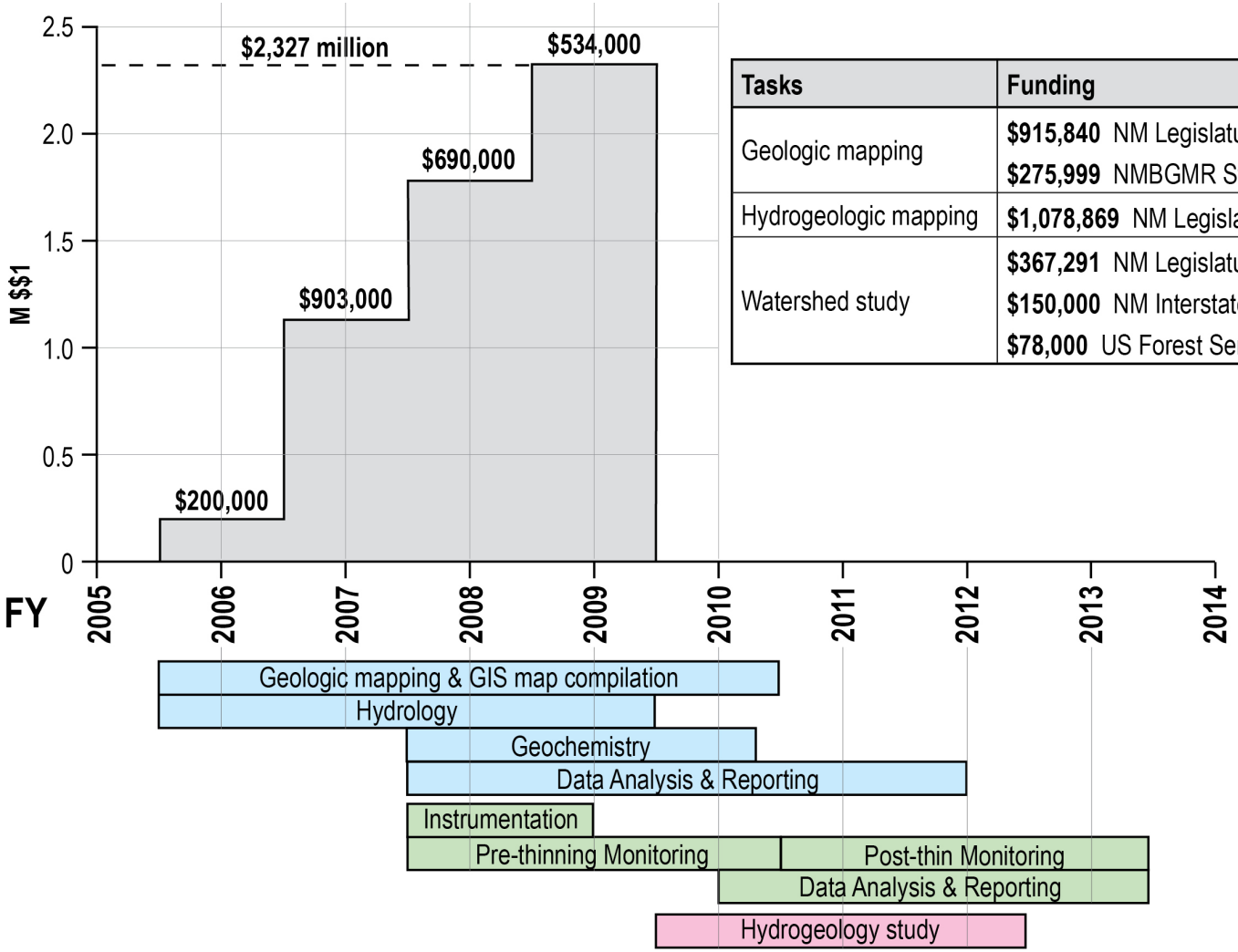
New Mexico Bureau of Geology and Mineral Resources
New Mexico Tech
Earth Science for the 21st Century

AQUIFER MAPPING PROGRAM

Background

- **Aquifer Mapping Program** geoinfo.nmt.edu/resources/water/home
- **Thinning trees in recharge area to increase groundwater levels, spring and stream flow in the Sacramento Mountains**
  - Large number of studies over the last 50 years
  - Results are highly variable and unpredictable
  - Site specific
- **Sacramento Mountain Hydrogeology study**
  - Comprehensive interdisciplinary basin-scale hydrogeology study
- **Sacramento Mountain Watershed study**
  - Quantify the effects of tree thinning on the local water budget

Funding History



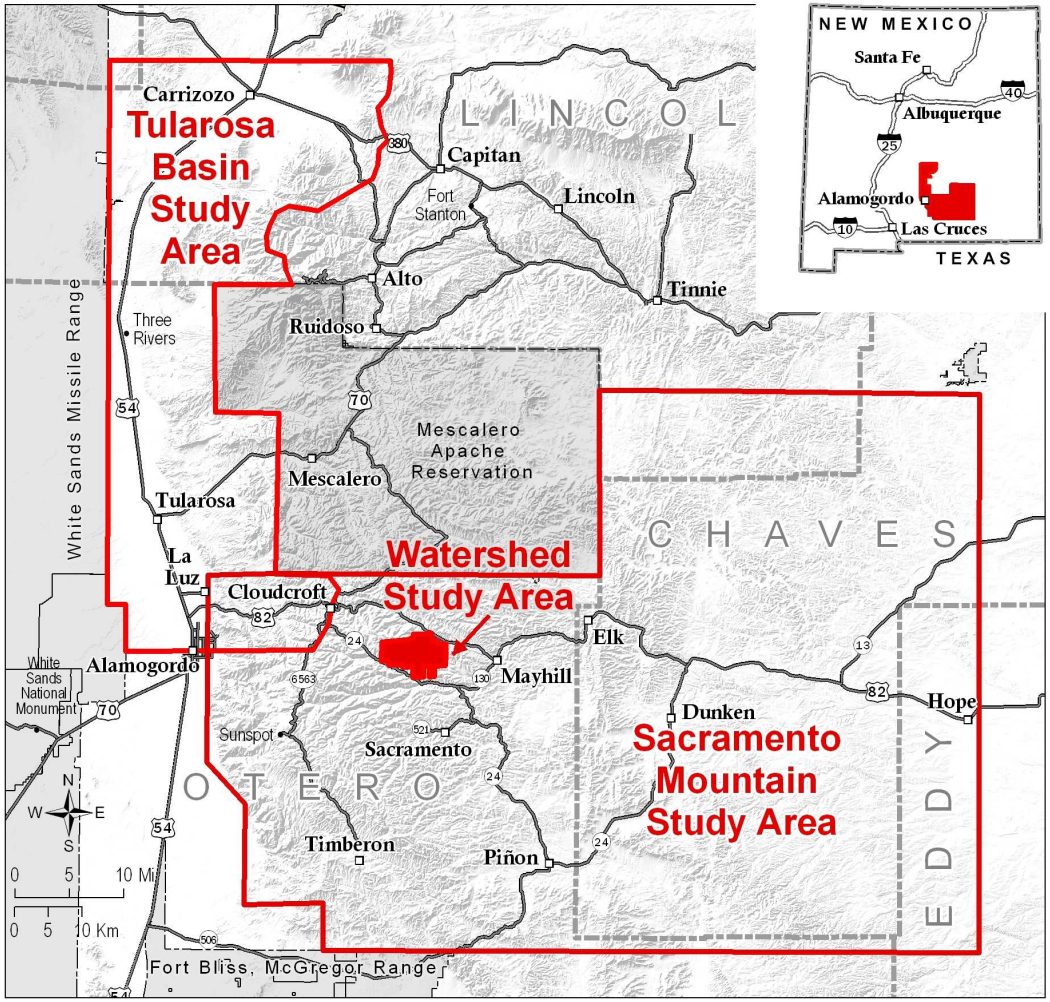
Tasks	Funding
Geologic mapping	**$915,840** NM Legislature (NMDA/NMSU and Otero SWCD) **$275,999** NMBGMR Statemap Program
Hydrogeologic mapping	**$1,078,869** NM Legislature (NMDA/NMSU and Otero SWCD)
Watershed study	**$367,291** NM Legislature (NMDA/NMSU and Otero SWCD) **$150,000** NM Interstate Stream Commission **$78,000** US Forest Service

Sacramento Mountain Study

Watershed Study

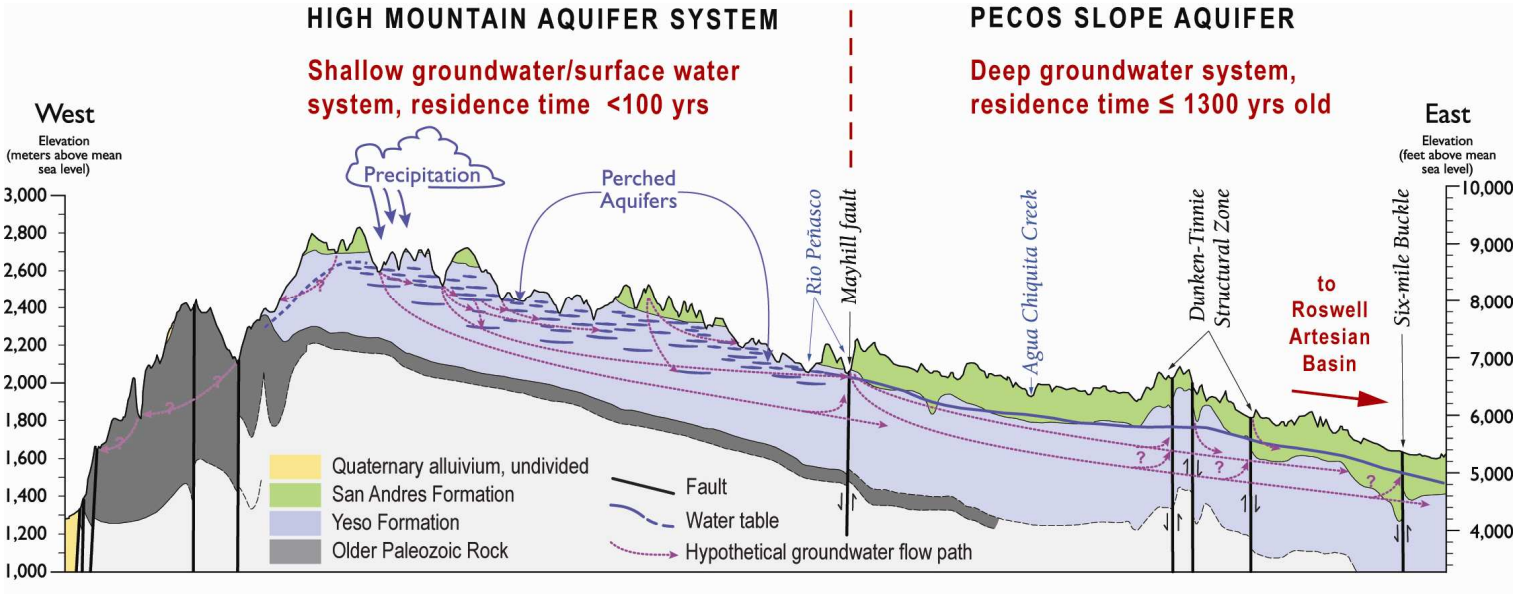
Tularosa Basin Study

Study Areas



- Sacramento Mountain Hydrogeology Study
- Watershed Study
- Tularosa Basin Hydrogeology Study

Sacramento Mountain Hydrogeology



Objective:

To evaluate recharge areas and connections to adjacent regional aquifers

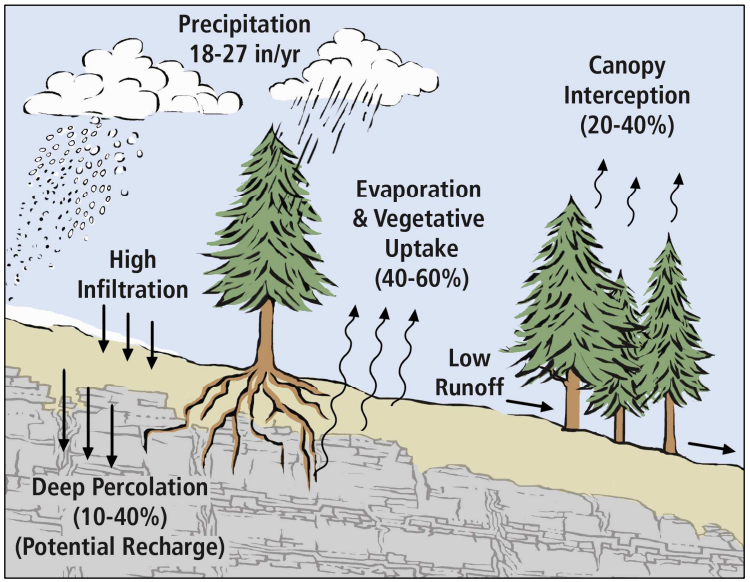
Partners: NRCS, Otero SWCD, NMISC, NM Tech (3 graduate students)

- **Outputs:**
  - Geologic Map
  - Progress reports and pamphlet geoinfo.nmt.edu/resources/water/projects/Southern_Sacramentos
  - Final Report (in final stages revision)
  - Student theses
- **Outcomes:**
  - Provides the framework for the watershed study
  - Prioritize forest management areas
  - Identify where and how land use activities may affect water quality and quantity

Watershed Study

Before thinning

After thinning



Water balance

Objective: To assess the effects of tree thinning on the local hydrologic system

- Monitor how local precipitation is distributed (ET, canopy interception, runoff, infiltration, deep percolation, etc.) before and after thinning
- Calculate a water balance before and after thinning
- Evaluate hydrologic response to tree thinning

Partners: landowner , Otero SWCD, NRCS, NMISC, NM Tech (2 graduate students), NMSU (graduate student), NM Forest and Watershed Restoration Institute (Highlands University), Carlsbad SWCD, US Forest Service, NM State Forestry

- **Outputs:**
  - Progress Report (June 2012)
  - Final Report (June 2013)
  - Student dissertation & theses
- **Outcomes:**
  - A better understanding of how, where and if tree thinning can be used as an effective method of increasing groundwater recharge in the Sacramento Mountains.